

REQUEST FOR RECONSIDERATION

As an initial matter, Applicants thank Examiner Morillo for the courtesies extended to Applicants' representative at the interview and follow-up discussion regarding the present application, in which the non-obvious differences between the claimed invention and the cited references were discussed. The following further expands on the discussions with the Examiner.

The present invention relates to production method for TiAl based alloys. For instance, claim 8 recites the following:

a step for holding a TiAl based alloy material containing Al at least in an amount of from 43 to 48 atomic % in an equilibrium temperature range of an α phase; and

a step for subjecting the TiAl based alloy material held at that temperature to high-speed plastic working, while cooling the material to a predetermined working terminal temperature.

(Present Claim 8).

As explained in the present specification, in many cases TiAl based alloys have been conventionally produced by casting.

However[,] the casting structure is generally large, and there is a tendency for the impact property of a material to decrease further. [Moreover, the] production of small parts such as vehicle parts is relatively easy. However[, the] production of large parts has been difficult due to problems with flowability of the molten metal in the mold.

(Present specification at page 2, line 23 through page 3, line 3).

Isothermal forging has also been used as a conventional forging method of TiAl based alloys.

Here, in order to develop a lamellar structure, it is necessary to pass through a zone in which the α -phase exists. With the isothermal forging, however, there is a problem in that since processing at a high temperature of 1150 °C or higher is not possible due to problems of the apparatus, the lamellar structure necessary for improvement of the mechanical property is not

developed in the forged material. In addition, production of large parts is also difficult.

(Present specification at page 3, lines 3-12).

The present invention solves “the problems in the TiAl based alloy and . . . provide[s] a TiAl based alloy excellent in workability, and with excellent strength as well as an improvement in ductility at room temperature, in particular, an improvement in the impact properties at room temperature, and a production [method] therefor.” (Present specification at page 4, lines 5-11). In particular, the production method produces a TiAl based alloy characterized by having a fine structure, i.e., a lamellar structure with a fine particle size. (See present specification at page 4, lines 15-19).

Claims 8-13 have been rejected under 35 U.S.C. § 103(a) as obvious over JP 2000-199025A (JP ‘025) in view of Matsuo (US Patent No. 5,348,702); and claims 8-18 have been rejected under 35 U.S.C. § 103(a) as obvious over Masahashi et al. (US Patent No. 5,370,839). The rejections are respectfully traversed, since the references, alone or in combination, do not describe or suggest the production method of the claimed invention.

In particular, the JP ‘025 reference generally relates to casting. (See paragraphs [0011] and [0012] of the Detailed Description of the machine-generated translation of the reference). The Matsuo and Masahashi et al. references generally relate to **superplastic working** (i.e., isothermal forging). (See column 4, lines 37-39 of the Matsuo reference and column 3, lines 23-27 of the Masahashi et al. reference).

As discussed *supra*, the present invention aims to obtain a product with good high temperature strength, which can be achieved by having compositions and treatments steps set forth in the claims. Such compositions and treatments lead to the formation of a lamellar structure with a fine particle size. By contrast, such a lamellar structure with a fine particle size is not obtained by the JP ‘025 reference, since the alloy is manufactured by casting. In the Matsuo and the Masahashi et al. references, the alloys have no lamellar structure that

confers good high temperature strength thereon, since in these references, the products are manufactured by superplastic working.

Applicants note that in the present invention, plastic working is conducted at high speed so as to form a lamellar structure in the alloy. (See present specification at page 7, line 25 through page 8, line 4). This is usually accompanied by a change in the shape of the alloy. In the JP '025 reference, however, hot isostatic press processing is carried out (see, e.g., paragraph [0012] of the reference), which neither forms a lamellar structure with a fine particle size nor causes a change in shape. Actually, in many cases, it ends with an *enlargement* of the particle size.

Further, regarding the Matsuo and the Masahashi et al. references, the alloys are in a $\gamma + \beta$ dual phase when performing plastic working. (See the Matsuo reference at column 2, line 53-54 and the Masahashi et al. reference at column 3, lines 6-27). This is because in that phase, lower strength and improved ductility at up to 1200 °C can be expected. In this method, a phase transformation is not desired; therefore, a specific composition, plastic working, and thermal treatment is employed so as not to cause formation of a lamellar structure with high temperature strength. In contrast, in the present invention, a phase transformation is actively employed, and after forging, a lamellar structure is formed, thereby obtaining a product with good high temperature strength. (See, e.g., the present specification at page 15, lines 8-14, page 16, line 15 through page 17, line 8, and Figures 3A to 3C, which show the phase transformation).

Therefore, the claimed invention clearly would not be obvious in view of the references alone, since the method of the claimed invention is entirely different. In addition, the combination of the JP '025 with either of the Matsuo or Masahashi et al. references is unobvious and not appropriate, since the Matsuo and Masahashi et al. references describe

Application No. 10/667,651
Reply to Office Action of October 19, 2005

plastic working that is not ideal for the production of the alloy described in the JP '025 reference.

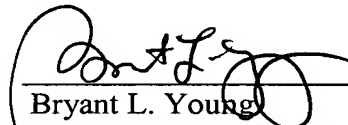
Accordingly, withdrawal of the rejections is respectfully requested.

Applicants submit that this application is now in condition for allowance and early notification of such is earnestly solicited.

Should the Examiner deem that any further action is necessary to place this application in even better form for allowance, the Examiner is encouraged to contact Applicants' undersigned representative at the below listed telephone number.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.
Norman F. Oblon


Bryant L. Young
Registration No. 49,073

Customer Number
22850

Tel: (703) 413-3000
Fax: (703) 413 -2220
(OSMMN 06/04)